



4910-9X

DEPARTMENT OF TRANSPORTATION

Office of the Secretary of Transportation

[Docket No. DOT-OST-2015-0169]

AGENCY: Department of Transportation, Federal Aviation Administration, and Pipeline and Hazardous Materials Safety Administration.

ACTION: Notice of Lithium Battery Safety Public Meeting and Request for Information.

SUMMARY: The U.S. Department of Transportation, including the Federal Aviation Administration's (FAA) Office of Hazardous Materials Safety and the Pipeline and Hazardous Materials Safety Administration's (PHMSA) Office of Hazardous Materials Safety, announce a public meeting seeking input on risk mitigation strategies to enhance the safe transport of lithium batteries by air. The meeting will include a discussion on pertinent safety recommendations of the International Civil Aviation Organization's (ICAO) International Multidisciplinary Lithium Battery Transport Group. The Department also invites comments and supporting data to be posted to the docket. Information presented at the public meeting or submitted to the docket will be used to help inform the Department as it prepares to participate in relevant ICAO Panel meetings this fall, including the ICAO Dangerous Goods Panel (DGP) meeting, currently scheduled for October 19-30, 2015. As is customary, another public meeting will be held prior to the upcoming ICAO DGP meeting.

DATES: The public meeting will be held on September 18, 2015, from 1:00 p.m. until 5:00 p.m. Written comments also may be submitted to docket no. DOT-OST-2015-0169 at www.regulations.gov.

MEETING INFORMATION: The public meeting will be held at the U.S. Department of Transportation Headquarters, 1200 New Jersey Avenue SE, Washington, D.C. 20590.

The Department requests that attendees pre-register for this meeting by completing the form at <https://www.surveymonkey.com/r/RZWHJMR>. Failure to pre-register may delay your access to the DOT Headquarters building. If participants are attending in person, arrive early to allow time for security checks necessary to obtain access to the building. Conference call-in and “live meeting” capability will be provided for the meeting. Conference call connection information will be provided to those who register and indicate that they will participate via conference call. An agenda will be posted to the docket prior to the meeting.

We are committed to providing equal access to this meeting for all participants. If you need alternative formats or other reasonable accommodations, please call (202) 267-9432 or email 9-AWA-ASH-ADG-HazMat@faa.gov with your request by close of business on September 10, 2015.

A panel of representatives from the FAA and PHMSA will be present. The meeting is intended to be informal, non-adversarial, and to facilitate the public comment process. No individual will be subject to questioning by any other participant. Government representatives on the panel may ask questions to clarify statements. Unless otherwise stated, any statement made during the meetings by a panel member should not be construed as an official position of the U.S. government. The meeting will be open to all persons, subject to the capacity of the meeting room and phone lines available for those participating via conference call. Every effort will be

made to accommodate all persons wishing to attend. We will try to accommodate all speakers, subject to time constraints.

ADDRESSES: You may submit comments by any of the following methods:

- Federal Rulemaking Portal: <http://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: 202-493-2251.
- Mail: Dockets Management System; U.S. Department of Transportation, Dockets Operations, M-30, Ground Floor, Room W12-140, 1200 New Jersey Avenue, S.E., Washington, DC 20590-0001.
- Hand Delivery: To U.S. Department of Transportation, Dockets Operations, M-30, Ground Floor, Room W12-140, 1200 New Jersey Avenue, S.E., Washington, DC, 20590-0001, between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.

Instructions: Include the agency name and docket number DOT-OST-2015-0169 for this Notice at the beginning of your comment. Note that all comments received will be posted without change to <http://www.regulations.gov> including any personal information provided. If sent by mail, comments must be submitted in duplicate. Persons wishing to receive confirmation of receipt of their comments must include a self-addressed stamped postcard.

Privacy Act: Anyone is able to search the electronic form of any written communications and comments received into any of our dockets by the name of the individual submitting the document (or signing the document, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement at <http://www.dot.gov/privacy>.

Docket: You may view the public docket through the Internet at <http://www.regulations.gov> or in person at the Docket Operations office at the above address (See ADDRESSES).

FOR FURTHER INFORMATION CONTACT:

Questions for FAA regarding the meeting can be directed to Janet McLaughlin, Director, Office of Hazardous Materials Safety, ADG-2, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone: (202) 267-9432; email: 9-AWA-ASH-ADG-HazMat@faa.gov. Questions regarding the meeting for PHMSA can be directed to Shane Kelley, Assistant International Standards Coordinator, Pipeline and Hazardous Materials Safety Administration, PHH-10, 1200 New Jersey Ave. SE., Washington, DC 20590; telephone: (202) 366-8553; email: shane.kelley@dot.gov.

SUPPLEMENTARY INFORMATION:

Background

The transportation by air of lithium cells and batteries to, from, or within the United States, and on U.S. registered aircraft operating anywhere in the world is subject to the U.S. Hazardous Materials Regulations (U.S. HMR).¹ The U.S. HMR authorize the use of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TI) subject to certain conditions and limitations provided all or part of the transportation is by air.² Representatives from the FAA and PHMSA participate in meetings of the ICAO DGP - the international body responsible for the ICAO TI. In consultation with the DOT, FAA, and other

¹ 49 CFR parts 171-180.

² Lithium batteries are regulated as Class 9 miscellaneous hazardous materials per the ICAO TI and the U.S. HMR.

relevant government agencies, PHMSA works to periodically harmonize the provisions of the U.S. HMR with international regulatory approaches, including the ICAO TI.

Safety Issue

The transportation of lithium batteries by air continues to raise significant safety concerns. Lithium batteries are known to be highly flammable and capable of self-ignition. Ignition of lithium batteries can be caused by a short circuit, overcharge, exposure to extreme temperatures, mishandling, or a defect. Once a battery is induced into such a state, either by internal failure or by external means such as heating or physical damage, the battery can generate sufficient heat to cause adjacent batteries to go into thermal runaway.

Testing conducted by the FAA William J. Hughes Technical Center (FAA Tech Center) has shown that heat and flames generated from thermal runaway in a single package can spread to adjacent packages. According to the International Coordinating Council of Aerospace Industries Association (ICCAIA), Boeing, and other aircraft manufacturers, once an event like this occurs, the fire suppression capabilities of an aircraft may be exceeded, potentially leading to a catastrophic loss of the aircraft because of a fire that cannot be contained.³

The FAA Tech Center research and findings, available at <http://www.fire.tc.faa.gov>, support the ICCAIA's and aircraft manufacturers' assessments. A fundamental concern highlighted by the FAA Tech Center's research is that the cargo compartment fire protection

³ A copy of the working paper submitted to the ICAO DGP Working Group Meeting held from April 27 – May 1, 2015 is available at <http://www.icao.int/safety/DangerousGoods/DGPWG15/DGPWG.15.WP.004.5.en.pdf>

standards were not designed to address the unique hazards associated with the transport of lithium batteries. Specific safety concerns include:

- The potential for propagation of thermal runaway between cells or batteries in a package and between adjacent packages of batteries;
- The potential for uncontrolled lithium battery fires to overwhelm the capability of existing aircraft cargo fire protection systems, leading to a catastrophic failure of the airframe; and
- The potential for venting of combustible gases from lithium ion cells in thermal runaway, which could collect in an enclosed environment and cause an explosion even in the presence of a suppression agent.

DGP Multidisciplinary Working Group on Lithium Batteries

In 2014, the ICAO DGP recognized that finding solutions to increase the safety of lithium battery transportation would require a multidisciplinary approach involving a wide range of experts, including those from the fields of dangerous goods (hazardous materials), aircraft operations, airworthiness, and battery manufacturing. This layered approach involves battery design, packaging standards, quantity limits, container capabilities, and fire suppression systems that can establish conditions in which lithium batteries may be transported without posing an unacceptable risk.

To that end, in 2014, the ICAO Air Navigation Bureau organized two International Multidisciplinary Lithium Battery Transport Coordination Meetings. The first was held from February 4-6, 2014, in Atlantic City, NJ, and the second was held from September 9-11, 2014, in Cologne, Germany. Discussions during the first meeting focused primarily on lithium metal batteries and the report from the first meeting, including recommendations, can be found at:

<http://www.icao.int/safety/DangerousGoods/DGP/ICAO.LB.COORDINATION.Meeting.Report.pdf>.

The second multidisciplinary working group meeting continued the work from the February 2014 meeting and developed fourteen recommendations related to enhancing the safety of air transportation of lithium batteries. These recommendations were forwarded by the multidisciplinary group to the ICAO Dangerous Goods, Flight Operations, and Airworthiness Panels for consideration. The report from the second meeting, including all of the recommendations, can be found at:

<http://www.icao.int/safety/DangerousGoods/Second%20International%20Multidisciplinary%20Lithium%20Bat/ICAO.LB.COORDINATION.2ndMeeting.Report.pdf>.

In April 2015, the ICAO DGP reviewed the recommendations of the multidisciplinary working group and prioritized the following efforts: (1) developing a performance-based provision to limit the probability of propagation of thermal runaway between cells; (2) limiting lithium-ion cells to a 30% state of charge during transport as an interim means to reduce the probability of propagation of thermal runaway between cells; and (3) developing a performance-based packaging standard.

On July 28, 2015, a third multidisciplinary working group meeting was convened to facilitate a focused discussion on the prioritized recommendations and develop options for addressing the recommendations for consideration by the ICAO DGP during the October 2015 meeting regarding (1) performance-based packaging standards; (2) system safety assessments for cargo aircraft; and (3) short term/interim actions that may be necessary.

Recommendations for Consideration by the ICAO DGP in October 2015

As a result of the July 2015 meeting of the multidisciplinary group, draft performance criteria were discussed to improve the air transportation of lithium batteries. In addition, the working group considered a recommendation that would require operators to perform safety risk assessments in order to establish whether they can manage the risk associated with the transport of lithium batteries as cargo on passenger or all cargo aircraft. With respect to the performance criteria, the group favored an approach that would provide layers of mitigation options to meet the performance criteria. The determination of how to meet the performance criteria could be tailored to individual circumstances and informed by a rigorous safety assessment. Finally the group discussed additional measures that could be taken while a performance standard is being developed.

The draft performance criteria are based on the principle that the hazardous effects associated with thermal runaway must remain within the package. The criteria specify that no hazardous quantities of flame and no hazardous fragments can exit the package. The surface temperature of the package also must be limited to prevent thermal runaway from spreading to adjacent packages and igniting adjacent packing material. Specific test methods remain to be developed.

The group recommended the following draft performance criteria, to be met at either the package level or the battery/cell level:

- No hazardous amount of flame would be allowed outside of the package.
- The external surface temperature of the package would not exceed the amount that would ignite packaging material or cause batteries or cells in adjacent packages to go into thermal runaway.

- No hazardous fragments would be able to exit the package and the package would need to maintain its structural integrity.
- The quantity of flammable vapor would need to be less than the amount of gas, that when mixed in air and ignited could cause a pressure rise in a [2.8 m³ compartment] volume that could dislodge the aircraft cargo compartment liners [3.44 kPa – 6.89 kPa (.5 psi – 1 psi)].

In addition to these criteria, the working group also considered whether performance criteria were necessary to address the risk associated with an external fire potentially compromising a package; however, there was no consensus reached on whether this should be part of a performance standard. The group recognized that the development of the means for compliance with the performance criteria could be done by either an ICAO working group or an external standards development organization.

Additionally, the group recommended that operators perform a safety risk assessment in order to establish if they could manage safely the risks associated with the transport of lithium batteries as cargo on passenger or all-cargo aircraft. In order to perform a safety risk assessment, information on the types and quantities of lithium batteries and cells being transported would need to be considered. The very limited capabilities of the fire protection system in a lithium battery fire event also would need to be considered. The group also recommended that guidance on how to conduct and evaluate a safety risk assessment be developed for operators. Guidance on safety risk assessments for operators and oversight by regulators also is expected to be addressed at the fall meeting of the ICAO Operations Panel (Annex 6).

Finally, the group was asked to consider additional interim measures that could reduce risk in air transport, including measures such as forbidding the carriage of lithium ion batteries as

cargo on passenger aircraft, eliminating the exceptions for certain small batteries in Section II of the ICAO TI lithium battery packing instructions, and reducing the state of charge of the battery in transport. There was no consensus reached by the group on these additional measures and no new recommendations were developed; however, it is expected these topics may be discussed further within the relevant ICAO Panels this fall.

Request for Public Input

The DOT, FAA, and PHMSA request input from all industry stakeholders and interested individuals on strategies to enhance the safe transport of lithium batteries aboard passenger and cargo aircraft by air, to include the foregoing options which are now under consideration by the ICAO DGP, as well as the ICAO Operations and Airworthiness Panels. To the extent that any of these options are ultimately adopted as new standards or revisions to the ICAO TI, consistent with 49 U.S.C. 5120, the Department may consider adopting the standards or revised ICAO TI through a rulemaking action. Therefore, the Department requests input at the upcoming public meeting, as well as submissions to the docket on risk mitigation strategies, information, and data to help further inform our work in this area as we prepare to participate in the fall 2015 ICAO Panel meetings regarding these subjects.

Specifically, the Department invites comment and recommendations, as well as any relevant supporting data, in the following areas:

- The draft performance criteria recommended by the third multidisciplinary group and how the criteria might be met at the packaging level or at the battery level to address the aviation fire hazards that have been identified.

- The recommendation that operators be required to perform a safety risk assessment in order to ensure management of the risks associated with the transport of lithium batteries as cargo on passenger or all-cargo aircraft to an acceptable level of safety.
- Additional measures which the group did not reach full consensus on, including:
 - Consideration of the effects of an external fire as an element of the performance criteria to protect against the risks of a fire not initiated by a battery within a package.
 - Forbidding the carriage of lithium ion batteries as cargo on passenger aircraft, as an interim measure.
 - Eliminating the exceptions for certain small batteries in Section II of the ICAO TI lithium battery packing instructions or alternative means to identify the types and quantities of lithium batteries or cells being transported in order to effectively inform a safety risk assessment.
 - Reducing the state of charge of the battery in transport.
- Qualitative and quantitative information on the potential impacts of implementing the above recommendations and/or additional measures, such as:
 - Determination of the current level of exposure to these fire hazards – Data or information on the volumes of batteries currently transported on passenger aircraft or those utilizing the provisions of section II of the ICAO TI.
 - Establishment of the current baseline – Data or information regarding the effectiveness of the current requirements, evolution in the market, voluntary safety actions, and emerging safety risks

- Potential benefits– Data or information providing estimates of potential safety benefits related to the recommendations and additional measures under consideration by ICAO, as well as alternatives that provide comparable or greater safety benefits.
- Potential costs– Data or information providing estimates of potential costs associated with the recommendations and additional measures under consideration by ICAO.
- Studies or analysis on the effectiveness of the recommendations and additional measures – Any studies that address how lithium batteries in differing packaging types or at varying charge states behave in aviation fire scenarios.

Issued in Washington, DC, on August 24, 2015.

Kathryn B. Thomson

General Counsel

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